

## METHOD AND APPARATUS PROVIDING TELESERVICE SEGMENTATION AND REASSEMBLY

### CROSS-REFERENCE TO A RELATED PATENT APPLICATION

This patent application is a continuation of and allowed U.S. patent application Ser. No. 08/746,088, filed Nov. 6, 1996 now U.S. Pat. No. 6,097,961, entitled "MOBILE STATION ORIGINATED SMS USING DIGITAL TRAFFIC CHANNEL", by Seppo Alanäjä and Steven J. Willhoff, the disclosure of which is incorporated by reference herein in its entirety.

### FIELD OF THE INVENTION

This invention relates generally to radiotelephones and, in particular, to mobile stations such as those capable of operation with a cellular network or with a personal communications network (PCN).

### BACKGROUND OF THE INVENTION

The so-called Short Message Service (SMS) is a Teleservice specified in some modern cellular communications systems, for example IS-136, for enabling a user to send messages to, and receive text messages from, the communications network. The SMS attempts to deliver a message to a mobile station (MS) whenever the mobile station is registered to the network, even when the mobile station is engaged in a voice or data call. The mobile station may roam throughout the network and still be capable of sending and receiving messages. As presently specified in IS-136.1, a mobile station configured for SMS provides methods for the user to receive, read, clear, send, and save messages.

The IS-136 specification presently enables both mobile station terminated (network to mobile station) and mobile station originated (mobile station to network) SMS. The SMS Point-to-Point, Paging and Access Response Channel (SPACH) is specified for use in the mobile station terminated SMS mode. As is specified in IS-136.1 Rev. A, Mar. 21, 1996, Section 7.1.1.2.1 and Section 7.1.2.2, a SMS Submit message is also defined for sending a SMS message from the mobile station. The SMS Submit message is specified to be sent to the network, more particularly to the Base Station/Mobile Switching Center/Interworking Function (BMI), in an R-DATA message. The R-DATA message is sent on a reverse (i.e., MS→BMI) digital control channel.

It can be appreciated that the use of the reverse digital control channel to send the mobile station originated SMS messages has the disadvantage of consuming a valuable system resource that could otherwise be used to convey signalling information for, by example, mobile station registration and call origination purposes. Typically, there are significantly fewer digital control channels assigned in a wireless communications system than there are traffic (e.g., voice and/or data) channels. While the use of the digital control channel may not be especially disadvantageous for one mobile station transmitting a relatively short SMS messages (e.g., less than about 200 characters), if several mobile stations were simultaneously transmitting longer SMS messages the overall system capacity can be reduced.

Furthermore, existing Teleservices place restrictions on the length of messages that can be transmitted from a mobile station using the R-DATA message. Such restrictions can be a significant disadvantage when it is desired to transmit a message that exceeds the specified maximum length of the R-DATA message for a particular system.

More particularly, and referring specifically to the IS-136 air interface, Teleservices are supported for SMS and Over the Air Service Provisioning, that is, Over-the-Air Activation Teleservices (OATS). Other Teleservices are envisioned in the future. These Teleservices utilize the Layer 3 R-DATA message to transport their transactions over the air interface. At the BMI the R-DATA message is translated into a Short Message Delivery Point-to-Point (SMDPP) message for relay through the IS-41 network. These two mechanisms (R-DATA and SMDPP) can each impose constraints on the size of a Teleservice or Application transaction. It would thus be desirable to provide a method to free the Teleservice definition from these arbitrary constraints. In fact, these constraints may be so onerous that they may effectively shut a particular Teleservice down.

In IS-136 the BMI may limit the size of R-DATA messages through the R\_Data\_Message Length information element provided in the Fast Broadcast Control Channel (F-BCCCH) Access Parameters message. This currently allows the BMI to limit mobile station originated R-DATA messages to either 31, 63, 127, or "Limited only by layer 2 format" (which provides approximately 250) bytes in length. There is also a proposal to define a new value that provides an air interface limit that conforms to the largest user data space that may be accommodated into one IS-41 SMDPP message. This is currently expected to be approximately 204 bytes.

### OBJECTS OF THE INVENTION

It is thus an object of this invention to provide a wireless communications system that implements a mobile station originated Teleservice function, such as SMS, without the use of a reverse digital control channel.

It is a further object of this invention to provide a cellular communications system that implements a mobile station originated Teleservice function, such as SMS, through the use of a digital traffic channel which is normally allocated for voice and data transmissions.

It is another object of this invention to provide a method for effecting signalling between a mobile station and a BMI so as to enable a reverse digital traffic channel to be used to convey a Teleservice message, and to avoid the use of a vocoder or data modem that would typically be connected to the traffic channel by the BMI.

It is one further object of this invention to provide a method for message transmission that is unconstrained by R-DATA or SMDPP message length restrictions.

### SUMMARY OF THE INVENTION

The foregoing and other problems are overcome and the objects of the invention are realized by methods and apparatus in accordance with embodiments of this invention.

A method of this invention is disclosed for operating a user terminal, such as a cellular radiotelephone, of a type that is bidirectionally coupled to a network through an RF interface. The method includes a first step of storing at least one message in a memory accessible by the mobile station. A second step transmits a Teleservice (e.g., SMS) origination request from the mobile station to the network using a reverse digital control channel. The request specifies that a reverse digital traffic channel be assigned to the mobile station. A next step, executed in response to being assigned to a reverse digital traffic channel, transmits the at least one stored message to a SMS center that is coupled to the network, the at least one stored message being transmitted over the assigned reverse digital traffic channel.